

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016

PEM0016 – ALGEBRA
(PE31)

5 MARCH 2016
2.30 p.m - 4.30 p.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **3** pages including the cover page.
2. Attempt **ALL FOUR** questions. All questions carry equal marks and the distribution of marks for each question is given.
3. Please write all your answers in the answer booklet provided.

Answer ALL the questions (100 marks).**Question 1 (25 Marks)**

- (a) Solve the inequality $\frac{x+4}{x+1} < x$. (7 marks)
- (b) Solve the equation $2^{x+3} = 8^{x-1}$. (4 marks)
- (c) Solve the equation $\log_4 x - \log_4 (x-2) = \frac{1}{2}$. (4 marks)
- (d) Solve the equation $(1+2x) - 4\sqrt{1+2x} + 3 = 0$ by reducing it to a quadratic in form equation. (10 marks)

Question 2 (25 Marks)

- (a) Let $f(x) = \frac{5x+8}{3x-4}$.
- (i) Find the inverse of $f(x)$. (6 marks)
- (ii) Let $g(x)$ be the inverse of $f(x)$ found in (i), show that $f(g(x)) = x$. (4 marks)
- (b) Express $\frac{3x-1}{(x+1)(x-3)}$ in partial fractions. (7 marks)
- (c) Explain how the following graphs are obtained from the graph of $y = f(x)$.
- (i) $y = f\left(\frac{1}{3}x\right)$ (2 marks)
- (ii) $y = 3f(x)$ (2 marks)
- (iii) $y = f(x+7)$ (2 marks)
- (iv) $y = -f(x)$ (2 marks)

Continued...

Question 3 (25 Marks)

- (a) In the expansion of $(1 + kx^2)^5$, find
- (i) the general $(r + 1)$ -th term of the expansion of $(1 + kx^2)^5$. (5 marks)
 - (ii) the value of k given that the coefficient of x^6 of the expansion of $(1 + kx^2)^5$ is 270. (8 marks)
- (b) Let $P(x) = (x^2 - 1)Q(x) + (ax + b)$. $P(x)$ has a remainder of 4 when it is divided by $(x + 1)$ and has a remainder of 2 when it is divided by $(x - 1)$. Find the values of a and b . (12 marks)

Question 4 (25 Marks)

- (a) Let $B = \begin{bmatrix} 1 & 1 & -1 \\ 2 & -3 & 1 \\ 2 & 1 & 2 \end{bmatrix}$.
- (i) Find the cofactor matrix of B . (9 marks)
 - (ii) Given that the determinant of B , $\det(B) = -17$. Find the inverse of B by using the cofactor matrix of B obtained in (i) of (b). (6 marks)
- (b) Apply the Cramer's Rule to solve the following system of equations.
- $$\begin{aligned} 3x + y &= 1 \\ 2x - 3y &= 8 \end{aligned}$$
- (10 marks)

End of Paper